Geometric Sequences

a sequence in which the consecutive terms have a common ratio (r) → multiplying

$$a_n = a_1 \cdot r^{n-1}$$

a_n = nth term r = common ratio
a_1 = 1st term n = # of the term

wkst

1. 2.5, −10, 40, −160 …

$r = \frac{-10}{2.5}$ $r = \frac{40}{-10}$ $r = \frac{-160}{40}$

$r = -4$ $r = -4$ $r = -4$ ✓ geometric

next 3 terms: 640, −2560, 10240

5. −23328, −3888, −648, −108 …

$r = \frac{-3888}{-23328}$ $r = \frac{-648}{-3888}$ $r = \frac{-108}{-648}$

$r = \frac{1}{6}$ Geometric ✓ next 3 terms $-18, 3, -\frac{1}{2}$

Dec 5-8:40 AM

Given a_1 & r, find 1st 5 terms & the explicit formula.

9. $a_1 = -3$, $r = -5$

-3 ($n=1$), 15 ($n=2$), -75 ($n=3$), 375 ($n=4$), -1875 ($n=5$)

$a_n = a_1 (r)^{n-1}$

$a_n = -3(-5)^{n-1}$ can't multiply!

11. $a_1 = -0.5$ $r = -2$

$-0.5, 1, -2, 4, -8$

$a_n = -0.5(-2)^{n-1}$

10th term → $a_{10} = -0.5(-2)^{10-1}$

$a_{10} = 256$

$\wedge(10-1)$
$\wedge 9$

Find common ratio & the term named

17. $a_n = 3 \cdot 2^{n-1}$ $r = 2$

$a_9 = 3 \cdot 2^{(9-1)}$

$a_9 = 3 \cdot 2^8 = 768$

21. $a_n = -3\left(\frac{1}{2}\right)^{n-1}$

$r = \frac{1}{2}$ $a_{12} = -3\left(\frac{1}{2}\right)^{12-1}$

$= -3(.5)^{11}$

$a_{12} = \frac{-3}{2048}$

Dec 5-9:04 AM

Geometric Series - sum of the terms in a geometric sequence

Finite Geometric Sequence: $S_n = a_1\left(\frac{1-r^n}{1-r}\right)$

Evaluate the series.

1. 1, 5, 25, 125, 625 $a_1=1$ $r=5$ $n=5$ terms

$1+5+25+125+625 = 781$ or $S = 1\left(\frac{1-5^5}{1-5}\right)$

$1(1-5\wedge5)$ enter

$\div(1-5)$ enter

2. 3, −9, 27, −81 $a_1=3$ $r=-3$ $n=4$

$S = 3\left(\frac{(1-(-3)^4)}{(1-(-3))}\right)$

$3(1-(-3)\wedge4)\div(1-(-3)) = -60$

Dec 5-9:32 AM

5. $a_1=1$ $a_7=4096$ $r=-4$

$a_1=1$ $r=-4$ $n=7$

$S_7 = 1\left(\frac{(1-(-4)^7)}{(1-(-4))}\right)$

$S_7 = 3277$

6. $a_1=1$ $a_8=128$ $r=2$

$S_8 = 1\left(\frac{(1-(2)^8)}{(1-2)}\right) = 255$

$1*(1-(2)\wedge8)$ enter

$\div(1-2)$ enter

7. $S_8 = 4\left(\frac{(1-(2)^8)}{(1-2)}\right)$

17. $-4-8-16-32\ldots$ $n=8$

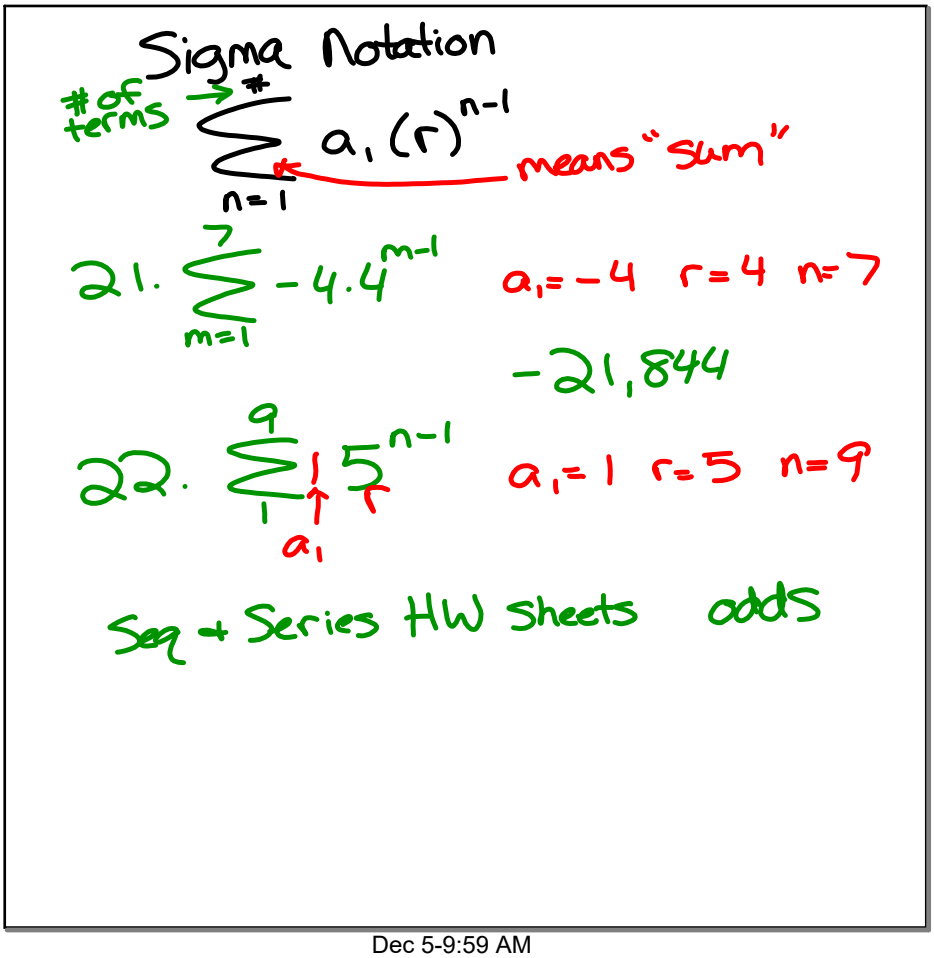
$a_1=-4$ $r=2$ $n=8$

$-4-8-16-32-64-128-256-512 =$

or $S_8 = -4\left(\frac{(1-(2)^8)}{(1-2)}\right)$

-1020

Dec 5-9:46 AM


Sigma Notation
# of terms
#
$\sum_{n=1}^{\#} a_1(r)^{n-1}$
means "sum"
21. $\sum_{m=1}^{7} -4 \cdot 4^{m-1}$
$a_1 = -4$ $r = 4$ $n = 7$
$-21,844$
22. $\sum_{1}^{9} 1\,5^{n-1}$
$a_1 = 1$ $r = 5$ $n = 9$
Seq + Series HW sheets odds

Dec 5-9:59 AM